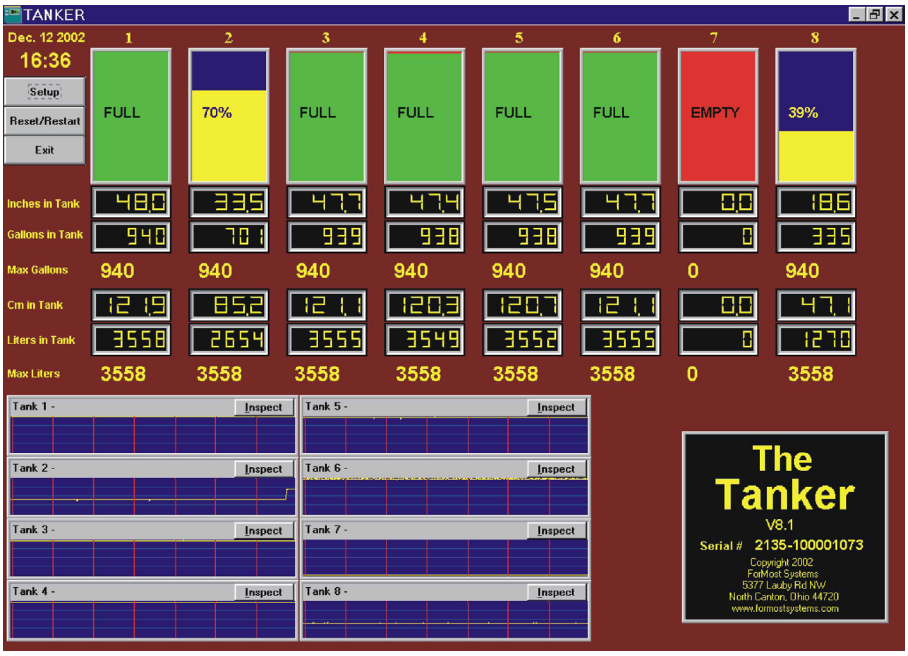
THE TANKER



V 8.1

USER MANUAL

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Introduction

The Tanker is a combination hardware/software system designed to be used with Krueger Sentry Gauge Company's ACU-GAUGE series of liquid level gauges.

The Tanker constantly monitors the level of liquid in a series of tanks and displays levels and capacities for those tanks as well as graphs of the levels over a user selectable time frame.

Theory of Operation

The Tanker has two separate display screens. The Main Screen for continuous operation and the Setup Screen for defining the operating parameters.

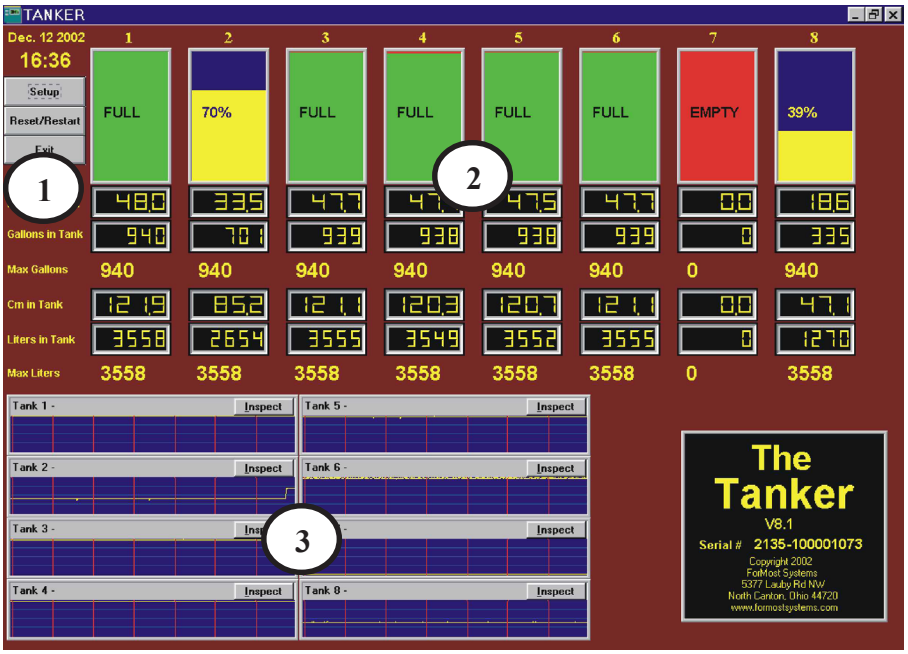
The Krueger Gauges provide a constant analog signal which is, at any moment, proportional to the level of liquid in the tank.

The Tanker hardware converts the analog signal from the Krueger Gauge to a digital signal for use by the software.

The Tanker software uses the digital signals along with the setup information to continuously update the displays and graphs on the main screen.

The Main Screen

The Main Screen is divided into three logical areas.
1. The control buttons
2. The graphic and numeric displays.
3. The history graphs.



The Control Buttons

Setup Button

This button, when clicked on using the mouse, will open The Tanker Setup screen.

Reset/Restart Button

This button will reset the software and start its operation again. This button should be used in any case where the operation of The Tanker appears incorrect. If this button does not correct the problem then an exit and restart should be performed.

Exit Button

This button will stop the operation of The Tanker.

The graphic and numeric displays

Graphic Displays

There are eight graphic displays at the top of the screen which represent the eight tanks the Tanker can monitor. These are large rectangular displays which indicate the current level of liquid in the tanks by varying the level of a yellow bar. The percentage of liquid in the tank is also displayed in the center of the graphic display. NOTE: The percentage is the inches or centimeters currently in the tank divided by the maximum inches or centimeters.

The graphic displays turn red when the tank level is below the low threshold setting as defined on the setup screen and turn green when the tank level is above the high threshold setting. The corresponding text specified in the High Label and Low Label setups will also be displayed with the green and red changes of the display.

Numeric Displays

The numeric displays under the graphic displays show the current inches, the current gallons, the maximum capacity in gallons of the tank, the current centimeters, the current liters, and the maximum capacity in liters of the tanks.

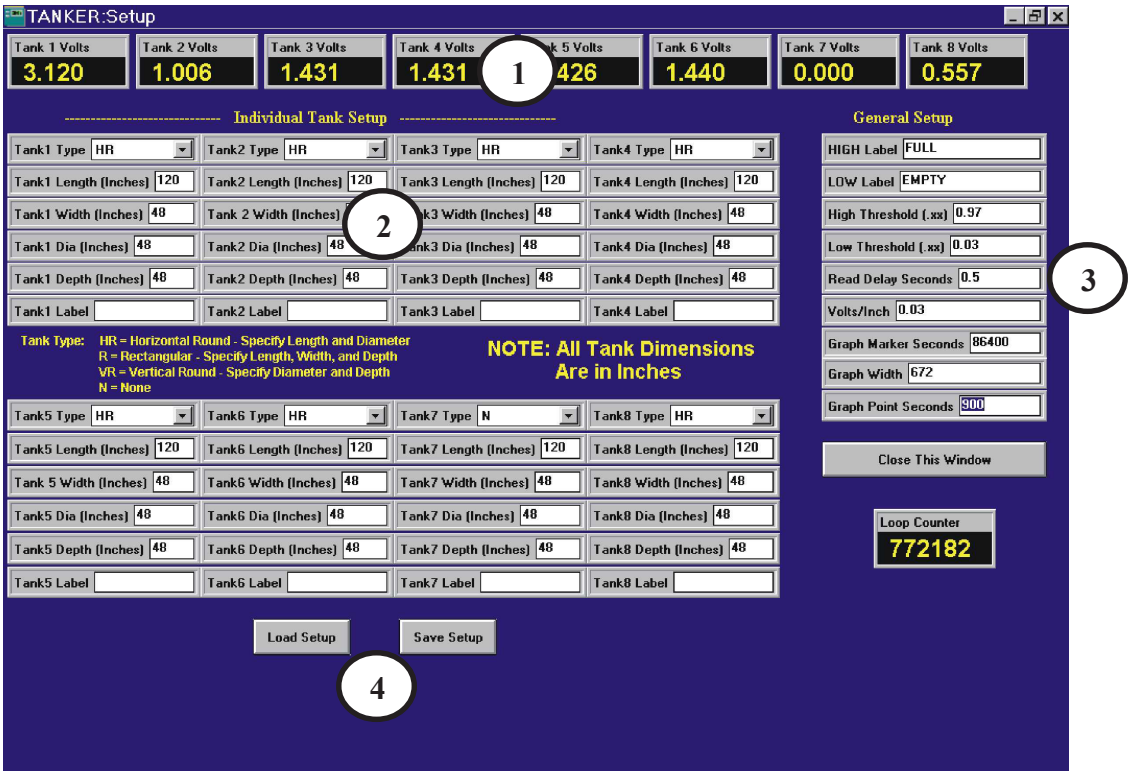
The history graphs

The history graphs in the lower left corner of the main screen show the history of the levels in the tanks. The percentage in the tank at any time is graphed at the frequency and over the time specified in the graph setup specifications on the Setup screen. The default is to graph the tank levels over seven days and mark the graph with a vertical bar at the end of each twenty-four hour period. The graphs are like strip recorders. They add the newest point at the right end and the oldest point falls off the left end. The right end of the graph will always be the current tank level. NOTE: At startup the graph will start at the right end and slowly move to the left as points are added. For example, using the default graph parameters, it would take a full seven days before the graph would have a line across its full width.

Each tank's graph also has an Inspect button in the upper right hand corner. This button, when clicked, will create a frozen copy of the graph (Everything will continue running while the frozen graph is analyzed). The frozen graph is in it's own separate window and can be resized and zoomed in and out. It can also be printed. The data from the graph can be placed on the Windows clipboard by clicking on EDIT then COPY . Once on the clipboard the data can be pasted into any compatible windows program such as Excel.

Setup Screen

The Setup Screen is divided into four logical areas.
1. The raw voltage displays.
2. The individual tank setup entry fields.
3. The general systems setup entry fields.
4. The control buttons.



The raw voltage displays.

The raw voltage displays are the eight small displays across the top of the setup screen. They display the actual voltage level coming from the gauges and are not processed in any way. This should be the starting point for any troubleshooting which may be necessary.

The individual tank setup fields.

The individual tank setup fields allow the specification of the tank type and size as well as a label to be displayed on the tank history graphs. The fields are as follows:

Type

The type of the tank can be specified as horizontal round (HR), rectangular (R), vertical round (VR), or none (N). (Default is horizontal round)

Length, width, diameter, and depth.

The tank measurements are:
Length is the longest horizontal measurement. (Not needed for vertical round tanks)
Width is the shortest horizontal measurement. (Not needed for any round tanks)
Diameter is self explanatory and is only used for round tanks.
Depth is the vertical measurement. (Only used for vertical round and rectangular tanks)
NOTE: All tank setup measurements are in inches.

Label

Any text in the label field will be displayed as part of the heading on the history graphs.

The general setup fields.

The general setup fields determine the overall operation of the Tanker system. The fields are:

Field Description	Default Value	Minimum	Maximum
High Label	HIGH	n/a	n/a
Low Label	LOW	n/a	n/a
High Threshold	.97	0.00	1.00
Low Threshold	.03	0.00	0.49
Read Delay Seconds	.5	0	60
Volts/Inch	.010	0	nomax
Graph Marker Seconds	86,400	5	86400
Graph Width	672	100	5000
Graph Point Seconds	900	5	86400

The label and threshold fields work together. When any tank reaches it's high threshold percentage the level bar changes from yellow to green and displays the word in the High Label field. When a tank drops to it's low threshold the level bar changes from yellow to red and displays the word in the Low Label field. NOTE: The percentage is entered as a decimal. (eg: 55% is entered as .55)

The Read Delay Seconds field is the length of time the system should wait between scans of the levels in all the tanks. The lower the value the more often the tank levels will be read. If this field is set to zero (0) then all tanks will be read approximately every 0.6 seconds.

The volts per inch tells the Tanker software what voltage to use as a scale factor for the particular gauges that are connected to the Tanker hardware.

The Graph marker seconds, width, and point seconds all work together to determine the time frame over which the graphs will display a trace and the fineness of that trace.
The graph point seconds is the period to update the graph with a new point. The default is 900 seconds which means that the system will add a point to the graph every fifteen (15) minutes (900 / 60 seconds = 15 minutes).
The graph width is the total number of points the graph will display across the horizontal (X) axis. The default is 672 which means that the graph will display seven days of data across it's full width (one point every 15 minutes is 672 points over seven days).

The graph marker seconds is the time between placing vertical marker bars on the graph. The default is 86,400 which is the number of seconds in a day. This means that using all the graph defaults the graph will display a period of seven days of level information. The current level will be on the right end of the graph and seven days prior will be at the left end. The graph will also have a vertical marker bar every 24 hours after the original start of the Tanker software.

The control buttons.

Save Setup

The first time the Tanker software is run on a computer system it will use the setup defaults to run. Once the user sets all the setup parameters the save setup button will save a copy of the changed setup. Ths setup will then be used each time the Tanker software is run on that computer.

Load Setup

The load setup button will load the last setup saved by the save setup button. This can be useful when you have changed the setup for experimental reasons and wish to return the system to it's previous saved setup.

Close This Window

Closes the setup window and returns to the main screen.

The setup screen also contains a display labeled "Loop Counter". This display is the number of times the Tanker software has read all eight tanks. This is mainly to show that the system is running. This display should add one to it's value every "Read Delay Seconds" seconds.

Hardware Installation

The Tanker requires a PC running Windows 98SE, ME, 2000, or XP. To determine your operating system version, go to

Start => Settings => Control Panel => System => General

and make sure the version number is 4.10.2222 or higher (Win98SE=4.10.2222, WinME=4.90.3000, Win2000=5.0.2195, WinXP=5.1.XXXX).

Once you have verified the Operating System version is suitable you are ready to begin the installation.

With the PC on and using the included cable, connect the Tanker to the USB port on the PC or USB hub. The USB cable provides power and communication for the Tanker. The status LED should immediately blink 4 times (at about 4 Hz), and then stay off while the Tanker enumerates.

Enumeration is the process where the PC's operating system gathers information from a USB device that describes it and it's capabilities. The low-level drivers for the Tanker come with Windows and enumeration will proceed automatically. The first time a device is enumerated on a particular PC, it can take a minute or two, and Windows might prompt you about installing drivers. Accept all the defaults at the Windows prompts, and reboot the PC if asked to do so. The Windows Installation CD might also be needed at this point. Make sure a CD with the correct version of Windows is provided. Enumeration occurs whenever the USB cable is connected, and only takes a few seconds after the first time.

When enumeration is complete, the LED will blink twice and remain on. This means Windows has enumerated the Tanker properly.

If the Tanker fails to enumerate:

- Make sure Windows OS version is 4.10.2222 or higher,
- Try connecting the Tanker to another PC,
- Try connecting a different USB device to the PC,
- Contact ForMost Systems support at support@formostsystems.com.

Hardware Warranty

The Tanker comes with a 90 day limited warranty from ForMost Systems, covering the Tanker and parts against defects in material or workmanship. **The Tanker can be damaged by misconnection (such as connecting 120 VAC to any of the screw terminals), and this warranty does not cover damage obviously caused by the customer.** If you have a warranty problem, email support@formostsystems.com for return instructions.

Limitation of Liability

ForMost Systems assumes no liability of any kind, including but not limited to incidental or consequential damages, for the use of this product.

Neither the Tanker software or hardware is intended for any type of medical use and should never be connected to or used on a human being or used for medical data collection.

Software Installation

The Tanker software is contained on the CD included in the Tanker product package.

To install the software place the CD into the PC's CD Drive. If the installation does not start automatically, display the files on the CD and double click on the setup.exe file on the CD.

Once installation starts you will be given a dialogue box to select an installation folder. You may specify a folder or just hit enter and use the default folder.

Once the installation is done go to *Start* => *Programs* => Tanker81 and click on Tanker81 to start the software.

Software Warranty

The Tanker software is warranted for a period of ninety days after purchase to operate substantially as defined in this manual. No warranty for suitability for a particular purpose is given. Each user must determine if the software is suitable for their application and use.

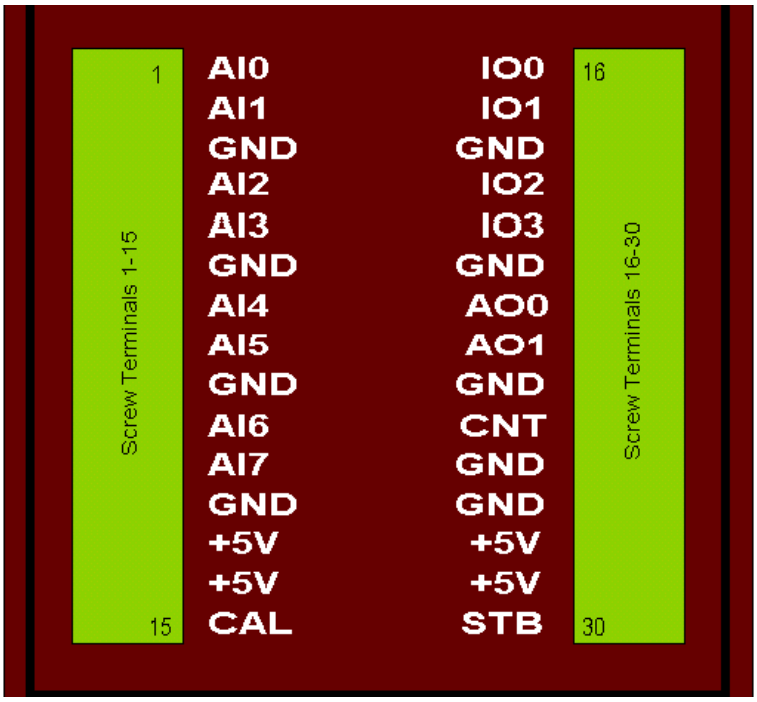
Software Copyright

The Tanker software is copyright 2002 by the ForMost Systems Division of ForMost Enterprises Inc. - Suite 200 - 5377 Lauby Rd NW - North Canton Ohio 44720.

Gauge Hookup

Once the gauges are installed in the tanks and the cable wires are brought to the location of the Tanker hardware it is necessary to connect the wires to the terminals on the Tanker hardware. It is very important that the wires be properly connected or damage to the Tanker hardware can occur.

Tanker Terminal Layout



The terminals labeled GND on the Tanker are for both signal and +5V power ground, if the +5V is being drawn from the Tanker.

The terminals labeled +5V can supply up to 100ma of +5V power to the gauges. NOTE: Do not connect power to the +5V terminals. The Tanker draws its power from the PC and does not need external power.

The AI0 through AI7 terminals are Analog Input terminals and 0 through 7 corresponds with Tanks 1 through 8.

f the gauges being connected to the Tanker require an AGGREGATE power of 100ma or less, then power may be drawn from the +5V terminals on the Tanker. If more than 100ma will be required then an external power supply should be used to supply power to the gauges.

The analog signal negative (-) wire from the gauge should be connected to one of the GND terminals.

The analog signal positive (+) wire from the guage should be connected to the corresponding analog input (AI) terminal. (AI0=Tank1, AI1=Tank2, ... AI7=Tank8).

Once the wires are properly connected, start the computer and the Tanker software to begin monitoring the tank levels.